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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/873,706	06/04/2001	Sridhar Gollamudi	3	4965

46290 7590 03/20/2006

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EXAMINER	
PERILLA, JASON M	

ART UNIT	PAPER NUMBER
2638	

DATE MAILED: 03/20/2006

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary	Application No.	Applicant(s)	
	09/873,706	GOLLAMUDI, SRIDHAR	
	Examiner	Art Unit	
	Jason M. Perilla	2638	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *05 August 2005*.

2a)☐ This action is **FINAL**. 2b)☒ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-13* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-13* is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☒ The drawing(s) filed on *10 May 2005* is/are: a)☐ accepted or b)☒ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: _____.

DETAILED ACTION

1. Claims 1-13 are pending in the instant application.

Drawings

2. New corrected drawings in compliance with 37 § CFR 1.121(d) are required in this application because the replacement drawing sheets filed May 10, 2005 are not properly specified as "REPLACEMENT DRAWING SHEETS". The Applicant specified that replacement drawing sheets were submitted on January 17, 2006, but no replacement sheets were received.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 § CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

3. The drawings are objected to under 37 CFR 1.83(a). The drawings must show every feature of the invention specified in the claims. Therefore, the correlation of between the received signals (claim 5) must be shown or the feature(s) canceled from the claim(s). No new matter should be entered.

Corrected drawing sheets in compliance with 37 CFR 1.121(d) are required in reply to the Office action to avoid abandonment of the application. Any amended replacement drawing sheet should include all of the figures appearing on the immediate prior version of the sheet, even if only one figure is being amended. The figure or figure number of an amended drawing should not be labeled as "amended." If a drawing figure is to be canceled, the appropriate figure must be removed from the replacement sheet, and where necessary, the remaining figures must be renumbered and appropriate changes made to the brief description of the several views of the drawings for consistency. Additional replacement sheets may be necessary to show the renumbering of the remaining figures. Each drawing sheet submitted after the filing date of an application must be labeled in the top margin as either "Replacement Sheet" or "New Sheet" pursuant to 37 CFR 1.121(d). If the changes are not accepted by the examiner, the applicant will be notified and informed of any required corrective action in the next Office action. The objection to the drawings will not be held in abeyance.

Response to Argument/Amendment

4. In view of the Applicant's remarks filed January 17, 2006 and a review of the prior art reference Harrison (U.S. Pat. No. 6154485), a new ground of rejection is made in view of Harrison.

Regarding the Applicant's argument against the prior art rejection of claims 1-13 under 35 U.S.C. §103(a) as being obvious over at least Harrison, the Applicant suggests that the prior art reference Harrison does not disclose every claimed feature. Specifically, the Applicant contests that the prior art reference does not disclose determining a correlation coefficient. The Applicant suggests "that a correlation coefficient is a numeric measure of the strength of a linear relationship between two random variables." (Appeal Brief, August 5, 2005; pg. 3, lines 7-8). Further, the Applicant provides an example of a correlation coefficient being a Pearson product-moment correlation coefficient. (Brief; pg. 3, lines 9-16). Further, the Applicant points to the specification, page 6, line 18 – page 12, line 14 for details regarding the correlation coefficient.

However, *none* of the specific limitations regarding a correlation coefficient which are pointed out by the Applicant are included in the claims. The specification (page 6, line 18 – page 12, line 14) does not provide for any of the specific description regarding the determination of a correlation coefficient provided in the Appeal Brief. That is, as broadly as claimed, the correlation coefficient is limited only as being determined using signals received by the at least two antenna. The claim **does not** provide for a correlation coefficient which measures a linear relationship between variables or is determined according to a Pearson product-moment correlation. Such limitations *are not contained in the claims* nor were they originally disclosed in the specification. Using the specification as originally filed, one is unable to associate any particular meaning, usage, or limitation to the determined coefficient from its "correlation" adjective.

5. The Examiner applies Harrison in a new ground for rejection. After additional review of the Harrison reference, the Examiner concedes that the adaptive array weights (fig. 1, refs. 90 and 92; V_0, V_1) are not a correlation coefficient. Rather, they are simply adaptive array weights applied to signals transmitted from transceiver 52 of figure 1.

However, Harrison provides that α is a correlation coefficient. The Applicant suggests that the correlation coefficient α may be selected arbitrarily. However, Harrison clearly provides that "[α] may allow base transmitter 52 to slowly disable the adaptive array mode in proportion to the degradation of the quality of the feedback data, which typically degrades as the speed of the subscriber unit increases." (col. 8, lines 32-35, emphasis added). Therefore, the value of α is not chosen arbitrarily. It is chosen at least in reference to the quality of the feedback data from the transceiver 56 to the transceiver 52 of figure 1. It is the Examiner's position that the correlation coefficient of Harrison and the instant application are determined and utilized for the same purposes. Compare Harrison's usage of the correlation coefficient in the selection of orthogonal coding and beamforming (i.e. switching between adaptive array mode and orthogonal coding as the speed of the subscriber increases) with that of the instant application provided on page 3, lines 8-13 of the specification (mobile stations traveling at higher speed require a transition from adaptive array mode to orthogonal coding).

In the rejections set forth below, it is the Examiner's position that the determined coefficient α of Harrison is a correlation coefficient because of its usage in the invention. That is, the correlation coefficient α determines the amount of correlation between the

signals transmitted on each of the two antennas. Explicitly, figure 4 illustrates how the correlation coefficient α determines the amount of signals 72 and 74 which are present on the first antenna (output 94) and the amount of signals 72 and 74 which are present on the second antenna (output 96). It is clear that if the value of α is zero, there is no correlation between the signals present on output paths 94 and 96. Alternatively, if the value of α is equal to the reciprocal of the square root of two, the correlation is at the highest. (col. 7, lines 50-52; col. 8, lines 5-35).

Claim Rejections - 35 USC § 112

6. The following is a quotation of the first paragraph of 35 U.S.C. 112:

> The specification shall contain a written description of the invention, and of the manner and process of making and using it, in such full, clear, concise, and exact terms as to enable any person skilled in the art to which it pertains, or with which it is most nearly connected, to make and use the same and shall set forth the best mode contemplated by the inventor of carrying out his invention.

7. Claim 5 is rejected under 35 U.S.C. 112, first paragraph, as failing to comply with the enablement requirement. The claim(s) contains subject matter which was not described in the specification in such a way as to enable one skilled in the art to which it pertains, or with which it is most nearly connected, to make and/or use the invention.

Regarding claim 5, according to the specification, the step of determining the at least one correlation coefficient is determined by using a look up table (page 10, lines 15-20; fig. 1, ref. 14) rather than by any type of correlation. One is unable to determine how correlation is utilized to create a correlation coefficient according to the specification because it relates the determination of a correlation coefficient with the use of a look up table.

8. The following is a quotation of the second paragraph of 35 U.S.C. 112:

> The specification shall conclude with one or more claims particularly pointing out and distinctly claiming the subject matter which the applicant regards as his invention.

9. Claims 1-13 are rejected under 35 U.S.C. 112, second paragraph, as being indefinite for failing to particularly point out and distinctly claim the subject matter which applicant regards as the invention.

Regarding claim 1, in lines 3-4, the limitation including "between received signals from the at least two antenna" is indefinite because one is unable to determine if the correlation coefficient is determined according to signals *transmitted from* the at least two antennae and received at another antenna(e) or if it is determined according to signals *received by* the at least two antennas.

Claims 2-13 are rejected as being based upon a rejected parent claim.

Claim Rejections - 35 USC § 103

10. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

11. Claims 1-2 and 5-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harrison (U.S. Pat. No. 6154485 – cited in IDS) in view of Ward et al (U.S. Pat. No. 6167286; hereafter "Ward")

Regarding claim 1, Harrison discloses a method of transmitting signals from at least two antennae (fig. 1; refs. 112, and 118) comprising the steps of: determining at least one correlation coefficient (α; col. 7, lines 50-52) from feedback signals received by the antennae (col. 8, lines 30-36); and in response to the at least one determined

coefficient selecting at least one of orthogonal coding and beamforming for transmitting signals using the at least two antennae (fig. 5; col. 8, lines 4-35). As discussed above, the correlation coefficient α utilized in figure 4 is a correlation coefficient because it determines the amount correlation between the two signals 108 and 110 respectively transmitted from the two antennae. Harrison discloses determining the at least one correlation coefficient from the feedback signal (col. 8, lines 30-36) received by the transceiver (fig. 1, ref. 52) but does not explicitly disclose that the feedback signal is received between both of the two antenna. While it is necessary that the feedback signal is received by at least one of the two antenna, it is at least implied or obvious that the feedback signal is received by both antennae. Furthermore, Ward teaches a multi antennae system according to figure 6. Ward teaches that having at least two antennae provides the advantage that the strongest signal from the two antennae may be chosen or signals from the two antennae may be combined (col. 5, lines 5-15). Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made for Harrison's transceiver to receive the feedback signal using both antennae as taught by Ward because using both antennae for the reception of the signal would allow for the selection of the strongest path of the received feedback or for a combination of the received paths to increase the signal strength.

Regarding claim 2, Harrison in view of Ward disclose the limitations of claim 1 as applied above. Further, Harrison discloses that the step of determining at least one correlation coefficient between the received signals comprises determining at least one amplitude correlation coefficient (fig. 5). The coefficient α of figure 5 determines the

amplitude correlation of the various input signals for transmission (fig. 5, refs. 72 and 74) to the various antenna by the weight multipliers (fig. 5, refs. 172 and 176) by the function $(1- \alpha^2)^{1/2}$. Therefore, the correlation coefficient determines at least one amplitude correlation coefficient.

Regarding claim 5, Harrison in view of Ward disclose the limitations of claim 1 as applied above. Further, as broadly as claimed, Harrison discloses that the step of determining at least one correlation coefficient (fig. 1, ref. 149; col. 5, line 65-col. 6, line 6) comprises determining at least one correlation between received signals.

Regarding claim 6, Harrison in view of Ward discloses the limitations of claim 1 as applied above. Further, Harrison discloses that the step of selecting at least one of orthogonal coding or beamforming comprises selecting a proportion of orthogonal coding relative to a proportion of beamforming of the transmitting signals (col. 8, lines 4-35).

Regarding claim 7, Harrison in view of Ward disclose the limitations of claim 6 as applied above. Further, Harrison discloses that the at least one correlation coefficient varies between a first level and a second level (col. 7, lines 59-61).

Regarding claim 8, Harrison in view of Ward disclose the limitations of claim 13 as applied above. Further, Harrison discloses that the at least one correlation coefficient having a level between the first and second levels results in selecting both beamforming and orthogonal coding for transmitting (col. 8, lines 22-35).

Regarding claim 9, Harrison in view of Ward disclose the limitations of claim 13 as applied above. Further, Harrison discloses that the at least one correlation

coefficient determines the proportion of beamforming relative to orthogonal coding used for transmitting (col. 8, lines 4-35).

Regarding claim 10, Harrison in view of Ward disclose the limitations of claim 9 as applied above. Further, Harrison discloses that the at least one correlation coefficient being at a level that is closer to the first level results in transmitting more beamforming than orthogonal coding (col. 8, lines 4-35).

Regarding claim 11, Harrison in view of Ward disclose the limitations of claim 9 as applied above. Further, Harrison discloses that the at least one correlation coefficient being at a level that is closer to the second level results in transmitting using more orthogonal than beamforming (col. 8, lines 4-35).

Regarding claim 12, Harrison in view of Ward disclose the limitations of claim 9 as applied above. Further, Harrison discloses that the at least one correlation coefficient relative to the first and second reference levels determines the relative amounts of beamforming relative to orthogonal coding used for transmitting (col. 8, lines 4-35).

Regarding claim 13, Harrison in view of Ward disclose the limitations of claim 7 as applied above. Further, Harrison discloses that the at least one correlation coefficient being substantially equal to the first level results in selecting beamforming for transmitting and wherein the at least one correlation coefficient being substantially equal to the second level results in selection orthogonal coding for transmitting (col. 8, lines 4-35).

12. Claims 3 and 4 are rejected under 35 U.S.C. 103(a) as being unpatentable over Harrison in view of Ward, and in further view of Forssen et al (US 6173014; hereafter "Forssen" – previously cited).

Regarding claim 3, Harrison in view of Ward disclose the limitations of claim 1 as applied above. Harrison discloses determining at least one correlation coefficient, but does not disclose that the step of determining at least one correlation coefficient comprises determining at least one phase correlation coefficient. The correlation coefficient of Harrison, α, is used to control the relative amount of beamforming to orthogonal coding used in the transmission (col. 8, lines 4-35). It is purely a real value having amplitude but not phase correspondence. However, one skilled in the art is familiar with adaptive beamforming and the use of phase adjustments applied to signals for the various antenna facets used in the transmission of a beamformed signal. Forssen teaches an adaptive beamforming system (fig. 4). Forssen also discloses that various phase shifts are made to the signals being applied to the various antenna facets to create a beam (col. 5, line 60-col. 6, line 17; *col. 6, lines 4-6*). Thereby, with the use of amplitude *and phase* information applied to the various signals transmitted to create a beam, the downlink carrier-to-interference ratio is improved. Therefore, it would have been obvious to one having ordinary skill in the art at the time which the invention was made to determine a phase correlation coefficient as taught by Forssen in the method of Harrison in view of Ward because the phase information can be advantageously utilized to create the adaptive beam which results in a lower carrier-to-interference ratio on the downlink.

Regarding claim 4, Harrison in view of Ward, and in further view of Forssen disclose the limitations of claim 3 as applied above. Further, it is inherent that the at least one phase correlation coefficient α of figure 5 is estimated because it is generated from the channel feedback (fig. 1, ref. 149; col. 5, line 65-col. 6, line 6).

Conclusion

13. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jason M. Perilla whose telephone number is (571) 272-3055. The examiner can normally be reached on M-F 8-5 EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Chieh M. Fan can be reached on (571) 272-3042. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Jason M. Perilla
March 13, 2006

jmp

CHIEH M. FAN
SUPERVISORY PATENT EXAMINER